

SECTION 3

Discussion of First, Second, and Third Quarter 1998 Results

3.1 Comparison of Water Levels

Water levels were measured at each RI monitoring well sampled during each quarterly sampling event. A comparison of depth to water below ground surface (bgs) and groundwater elevations at the time of the first, second, and third quarter sampling are provided for the RI monitoring wells in Table 2-1. Additionally, these measurements are incorporated into the GIS database, converted to elevations above mean sea level (MSL), and presented as hydrographs (Figure 3-1).

Water levels in Crystal Springs (Area 2) remained constant during the first half of 1998 followed by drops in water levels on the order of 2 to 5 feet. Water levels in North Hollywood (Area 1) showed increases between 2 to 15 feet (NH-CO1-325) with the exception of those in the vicinity of the North Hollywood extraction wells, which dropped 2 to 5 feet. Generally, water levels remained fairly constant in Verdugo (Area 3) and Pollock (Area 4).

3.2 Comparison of Quarterly Analytical Results

Concentration data from the first, second, and third quarter sampling events are provided for TCE in Tables 3-1, 3-2, and 3-3 and for PCE in Tables 3-4, 3-5, and 3-6. Flags used in the "Current Value" columns indicate (1) samples that contain reported TCE or PCE concentrations greater than the MCL of 5 µg/L, or (2) samples that exhibit a marked change in concentration during the current quarter from the previous quarter sampling. A "marked change" in concentration is considered a change in concentration between the following categories:

- 0 to 5 µg/L
- Greater than 5 to 50 µg/L
- Greater than 50 to 100 µg/L
- Greater than 100 to 500 µg/L
- Greater than 500 to 1,000 µg/L
- Greater than 1,000 to 5,000 µg/L
- 5,000 µg/L

For example, if a sample had a reported concentration of 550 µg/L TCE for the current quarter, but a reported concentration of 60 µg/L during the previous quarter, a flag of +2 would be present in the "Current Value" column of Tables 3-1 through 3-6. If the reported sample concentration had decreased to the next lower category, the flag would read -1. These concentration categories are the same as those used during preparation of basinwide TCE and PCE contaminant concentration maps.

Nitrate data for RI monitoring wells sampled during the first, second, and third quarters of 1998 are provided in Tables 3-7, 3-8, and 3-9, respectively. Flags within the "Current Value" column of Tables 3-7 through 3-9 indicate samples that (1) contain reported concentrations of nitrate greater than the MCL of 45 mg/L (as NO₃), and (2) exhibit a marked change in reported nitrate concentration

from the current quarter to the previous quarter. A marked change in nitrate concentration (as NO₃) is herein defined as a change in concentration between the following categories:

- 0 to 20 mg/L
- Greater than 20 to 45 mg/L
- Greater than 45 to 65 mg/L
- 65 mg/L

Numerical flags in the "Current Value" column of Tables 3-7 through 3-9 follow the same logic as described above: a reported nitrate concentration increase of one category relative to the previous quarter's sample will read +1; a decrease of two categories will read -2.

3.2.1 TCE Concentrations

Reported TCE concentrations at 43 of the 49 RI monitoring wells sampled during the first quarter of 1998 are typically not markedly changed relative to the previous values for these wells (Table 3-1). The number of RI monitoring wells exhibiting concentrations of TCE greater than the MCL of 5 µg/L remained the same at 31 wells. Data from the first quarter show that five wells, CS-C01-285, CS-VPB-04, CS-VPB-05, CS-VPB08, and NH-VPB-14, exhibited increases of one category (100 to 220 µg/L, 260 to 620 µg/L, 89 to 190 µg/L, 48 to 92 µg/L, and 210 to 810 µg/L, respectively). One well, PO-VPB-01, exhibited a decrease of one category (6 to 5 µg/L).

Comparison of the TCE data for the second quarter with data from the first quarter shows an uncharacteristic fluctuation in values; 13 are different from the previous quarter (Table 3-2). The number of RI monitoring wells exhibiting concentrations of TCE greater than the MCL of 5 µg/L increased from 31 to 32 monitoring wells. Four monitoring wells in the quarterly program, NH-C02-220, NH-C04-240, NH-C05-160, and NH-VPB-05, did exhibit an increase of TCE concentration of at least one category (2 to 12 µg/L, 3 to 7 µg/L, 100 to 120 µg/L, and 3 to 8 µg/L, respectively). However, nine monitoring wells, CS-C01-105, CS-C01-285, CS-C03-100, CS-C03-465, CS-VPB-04, CS-CVPB-07, NH-VPB-01, NH-VPB-14, and PO-C03-182, exhibited a decrease of one category (200 to 100 µg/L; 220 to 95 µg/L; 4,300 to 580 µg/L; 6 to 5 µg/L; 620 to 180 µg/L; 7,800 to 1,400 µg/L; 240 to 97 µg/L; 810 to 78 µg/L; and 6 to 5 µg/L, respectively). This may have been an anomaly at the laboratory or during sample collection, because the reported concentrations for these wells increased by one category during the following event as discussed below.

Comparison of the TCE data for the third quarter with data from the second quarter shows a similar fluctuation in observed concentrations. The number of RI monitoring wells exhibiting concentrations of TCE greater than the MCL of 5 µg/L increased to 33 wells (Table 3-3). However, there was significant fluctuation between the reported concentration categories. Eleven monitoring wells, CS-C01-105, CS-C01-285, CS-C03-465, CS-VPB-01, CS-VPB-04, CS-VPB-07, NH-C02-520, NH-VPB-01, NH-VPB-14, PO-C03-182, and PO-VPB-01, did exhibit an increase of TCE concentration of one category (100 to 190 µg/L; 95 to 260 µg/L; 5 to 8 µg/L; 81 to 130 µg/L; 180 to 700 µg/L; 1,400 to 8,900 µg/L; 37 to 120 µg/L; 97 to 220 µg/L; 78 to 220 µg/L; 5 to 6 µg/L; and 4 to 5 µg/L, respectively). Eight of these wells are comparable to the wells exhibiting decreases during the previous quarter. Two monitoring wells (NH-C02-220 and NH-C03-380) exhibited a decrease of one category (12 to 4 µg/L and 11 to 2 µg/L, respectively).

Historic concentration data acquired to date for TCE samples obtained for the RI wells are presented in Figure 3-2. The historic concentration data include the TCE data reported below laboratory detection limits. Concentrations that are reported below laboratory detection limits are plotted and indicated as "nondetected" concentrations in Figure 3-2. Data used to construct these historic graphs were obtained during sampling conducted by CH2M HILL beginning in 1992 and

sampling conducted by LADWP and James M. Montgomery, Inc. (JMM), between July 1989 and March 1991.

3.2.2 PCE Concentrations

PCE data exhibited little changes in the first quarter of 1998 compared to previous values (Table 3-4). The number of wells with PCE concentrations greater than the MCL of 5 µg/L increased by two to 27. At five wells, an increase of one category (100 to 185 µg/L at CS-C01-285, 40 to 52 µg/L at CS-C03-100, 42 to 56 µg/L at CS-VPB-08, 74 to 140 µg/L at NH-VPB-01, and 79 to 250 µg/L at NH-VPB-14) was observed. There were no wells with significant decreases compared to the previous quarter.

The number of RI monitoring wells exceeding the MCL for PCE during the second quarter of 1998 decreased from 27 to 25 wells (Table 3-5). In comparison to the previous quarter, nine wells (CS-C01-105, CS-C01-285, CS-C02-335, CS-C03-100, CS-VPB-06, NH-C03-380, NH-C03-580, NH-VPB-01, and NH-VPB-14) exhibited an decrease of one category (200 to 66 µg/L, 180 to 57 µg/L, 210 to 97 µg/L, 52 to 39 µg/L, 6 to 5 µg/L, 11 to 3 µg/L, 6 to 2 µg/L, 140 to 87 µg/L, and 250 to 9 µg/L, respectively). No wells were observed to have increases between categories. Five of the wells exhibiting decreases in PCE concentrations during this quarter also had similar decreases for TCE concentrations. This comparison corroborates the probability of either sampling or laboratory errors during this sampling event.

The number of sampled RI monitoring wells exceeding the MCL for PCE during the third quarter of 1998 remained consistent at 25 wells (Table 3-6). Comparison of PCE concentrations for the third and second quarter 1998 sample events show increases similar to those observed for TCE during this event. One well (NH-VPB-07) exhibited a decrease of one category (6 to 3 µg/L). Five wells (CS-C01-105, CS-C01-285, CS-C02-335, CS-VPB-01, and NH-C03-580) were observed to have increased this quarter (66 to 140 µg/L, 57 to 150 µg/L, 97 to 140 µg/L, 65 to 170 µg/L, and 2 to 8 µg/L, respectively). All of these wells had exhibited a decrease during the previous sampling event.

Historic data obtained by CH2M HILL and JMM to date for PCE concentrations in the RI wells are presented in Figure 3-3. Concentrations of PCE that are reported below laboratory detection limits are plotted and indicated as "nondetected" concentrations in Figure 3-3.

3.2.3 Nitrate

Of the 49 RI monitoring wells sampled during the first quarter of 1998, 12 exhibited concentrations exceeding the nitrate MCL of 45 mg/L (as NO₃) compared to 18 the previous quarter (Table 3-7). Seven wells exhibited a category decrease in reported nitrate concentration from the previous sampling; however, one of those wells still exceeded the MCL. Two wells exhibited a category increase, although both remained below the MCL.

During the second quarter, nitrate concentrations greater than the MCL were observed at 23 of the 83 monitoring wells sampled (Table 3-8). Comparison of the values of nitrate for the first quarter with values from the second quarter shows that the values are markedly changed at five wells, with four wells (CS-C05-160, CS-VPB-04, NH-VPB-07, and VD-VPB-05) showing increases of one category and one well (CS-VPB-10) showing an increase of one category. The marked increase of wells exceeding the MCL compared to the previous sample event is indicative of the inclusion of monitoring wells included the triennial sampling schedule. Wells are placed in the triennial program as a result of less than detection limit concentrations of VOCs; however, they may still have nitrate exceeding the MCL.

During the third quarter, nitrate concentrations greater than the MCL were observed at 17 of the 52 monitoring wells sampled (Table 3-9). However, comparison of the values of nitrate for the second quarter with values from the third quarter shows changes of one category at seven wells. Two RI monitoring wells (CS-C05-160 and NH-VPB-06) exhibited a decrease of one category. Five RI monitoring wells (CS-VPB-10, NH-C02-325, NH-C03-580, VD-VPB-03, and VD-VPB-07) exhibited an increase of one category.

Figure 3-4 presents the historical data obtained for nitrate concentrations for the RI wells. Concentrations of nitrate that are reported below laboratory detection limits are plotted and indicated as "nondetected" concentrations in Figure 3-4.

3.2.4 Other VOCs

During the first quarter sampling event, nine wells (CS-C03-100, CS-C02-335, CS-VPB-04, CS-VPB-05, CS-VPB-06, CS-VPB-07, CS-VPB-08, PO-VPB-02, and PO-VPB-08) exceeded the MCL for VOCs other than TCE and PCE (Table 3-10). Compounds detected in these wells include carbon tetrachloride, methylene chloride, 1,1-dichloroethylene, and 1,1-dichloroethane at CS-C03-100; carbon tetrachloride, methylene chloride and 1,1-dichloroethylene at CS-VPB-06 and CS-VPB-07; 1,1-dichloroethylene and methylene chloride at PO-VPB-02 and CS-VPB-04; 1,1-dichloroethylene at PO-VPB-08 and CS-VPB-05; and, methylene chloride at CS-C02-335 and CS-VPB-08. The detections of methylene chloride appear to be from laboratory artifacts, because this compound has rarely been detected in previous sampling events and was not reported during the subsequent events this year.

During the second quarter event, five wells (CS-C03-100, CS-VPB-04, CS-VPB-06, CS-VPB-07, and PO-VPB-02) exceeded the MCL for VOCs other than TCE and PCE (Table 3-11). Compounds detected in these wells include carbon tetrachloride, 1,1-dichloroethylene, and 1,1-dichloroethane at CS-C03-100 and CS-VPB-07; 1,1-dichloroethylene at PO-VPB-02, CS-VPB-04, and CS-VPB-06; and carbon tetrachloride at CS-VPB-06.

During the third quarter sampling event, seven wells (CS-C03-100, CS-VPB-04, CS-VPB-06, CS-VPB-07, PO-VPB-02, PO-VPB-08, and NH-C02-520) exceeded the MCL for VOCs other than TCE and PCE (Table 3-12). Compounds detected in these wells include 1,1-dichloroethylene, 1,1-dichloroethane, and carbon tetrachloride at CS-C03-100 and CS-VPB-07; 1,1-dichloroethylene and carbon tetrachloride at CS-VPB-06; carbon tetrachloride at NH-C02-520; and, 1,1-dichloroethylene at CS-VPB-04, PO-VPB-02, and PO-VPB-08.

MTBE was detected at 11 monitoring wells; however, only five wells had concentrations over 1 µg/L. The maximum concentration was 26 µg/L at NH-VPB-01.

3.3 Concentration Contour Maps

TCE and PCE are common and widespread contaminants in the San Fernando Valley Basin, and may at least roughly reflect the distribution of other contaminants. To evaluate the lateral and vertical distribution of TCE, PCE, and nitrate in the SFV, depth-specific concentration contour maps were created using current data from CH2M HILL's GIS database (Figure 3-5). This database includes water quality and water level data for the RI wells and also data from local facilities in the SFV, transmitted by the California RWQCB and LASC. Data from local groundwater purveyors (LADWP, the cities of Glendale and Burbank, and Crescenta Valley County Water District) were also incorporated into the GIS database.

3.3.1 Interval Selection

The depth intervals for the 1998 concentration contour maps are based on (1) water level data from RI monitoring wells, facility wells, and production wells; (2) screened intervals in monitoring wells, facility wells, and production wells; and (3) concentration values for TCE, PCE, and nitrate from the most recent sampling event. The concentration of TCE, PCE, and nitrate is typically greater in wells with screens at or near the water table, with groundwater contamination apparently attenuating with depth. Based on these data, two sets of depth-specific concentration contour maps were developed based upon wells that are screened: (1) within 50 feet of the water table and (2) more than 50 feet below the water table.

Data from production wells, facility wells, and landfill monitoring wells are categorized in the same manner as the RI monitoring wells. Production wells with the top of their screened interval within 50 feet of the water table are in the upper interval, and wells with the top of their screen greater than 50 feet below the water table are in the lower zone. Production well data are posted on the concentration contour maps; however, the concentration of the contaminant within the well is considered only as an indicator on the upper zone maps because the contaminants may be diluted with production of water from deeper, cleaner intervals.

3.3.2 Estimated Aerial Extent

The depth-specific concentration contour maps combine available water quality data with professional judgment to present a simplified "smoothed" depiction of TCE, PCE, and nitrate contaminants in the eastern SFV (Figures 3-6 through 3-11). However, due to lack of available data, areas outside the colored zones may also be contaminated. The figures were prepared by hand contouring the relative concentration contours onto GIS-generated maps depicting available TCE, PCE, and nitrate values. Several assumptions and simplifications were made in preparation of the figures.

For EPA RI monitoring wells, facility wells, and production wells incorporated in the SFV GIS, the areas of contamination are based on time-specific rationale for selection of the representative data. This rationale incorporates all available data while eliminating "old" data that may not be representative of current conditions. The criteria for this rationale are presented in Appendix B.

The figures do not show the maximum contaminant concentrations known to have occurred at the wells. Using the most recent value, not the maximum or average value, does not significantly affect the interpretations shown in the concentration contour maps. This method, however, could potentially affect the locations of contours in areas where contaminant concentrations are near one of the dividing levels between concentrations.

Because the data incorporated into the GIS are obtained from various sources with varying schedules of sampling, the figures are not a "snapshot in time," but, rather, a representation of the most recently available contamination data observed at each location over several months.

The estimated direction and magnitude of groundwater flow are used to assist in estimating the shape and size of the downgradient extent of individual zones of contamination. These parameters are also used for approximating the lateral boundaries, although these boundaries are more readily determined from reported concentration values. The groundwater flow directions are fairly well understood, but the downgradient margins of contamination are not as well understood.

TCE and PCE contaminant data from production wells in the LADWP North Hollywood well field were reviewed to estimate the western extent of the "area of detectable concentration."

3.3.3 Upper Interval Concentration Contour Maps

Concentration contours throughout the shallow interval are based on available TCE and PCE data (Figures 3-6 through 3-8). The 5- $\mu\text{g/L}$ concentration contour for both TCE and PCE is similar to previous maps. Additional data have allowed refinement of the 5- $\mu\text{g/L}$ concentration contour in the South Glendale area. This area covers the eastern and southern portions of the North Hollywood NPL site and the majority of the Crystal Springs and Pollock NPL sites. Based on available data, an estimate of the concentration contour enclosing an area above the laboratory detection limit of 2 $\mu\text{g/L}$ for TCE and PCE is drawn. This contour generally conforms to the shape of the 5- $\mu\text{g/L}$ concentration contour line. A larger portion of the North Hollywood NPL site is included within this contour line in addition to an elongated northwest-southeast area directly north of the North Hollywood NPL site.

The apparent highest concentrations of TCE and PCE in the upper interval occur in the following:

- An elongated area extending in a southeasterly direction beginning east of the Burbank Airport. For TCE, this elongated area is approximately 2 miles long and 1-1/2 miles wide; while for PCE, it is approximately 3 miles long and 1 mile wide. Within this area, TCE concentrations as high as 8,900 $\mu\text{g/L}$ (CS-VPB-09) and PCE concentrations as high as 22,040 $\mu\text{g/L}$ (LASC 3850M) are observed.
- A southeasterly trending area was observed at facility monitoring wells in the vicinity of the North Hollywood Extraction wells with isolated concentrations of TCE as high as 6,000 $\mu\text{g/L}$; however, these data are 2 years old because recent data have not become available. Other areas of TCE concentrations between 50 and 100 $\mu\text{g/L}$ are also evident in this area. Recent data from LADWP NH-33 indicate not detectable concentration for TCE and PCE. For PCE, several small isolated areas exceeding 50 $\mu\text{g/L}$ are observed in the North Hollywood area.
- For TCE, a southeasterly trending area, approximately 1-1/2 miles long by 1/2 mile wide, was observed beginning north of the North Glendale Operable Unit (OU). Recent data indicate TCE concentrations over 5,000 $\mu\text{g/L}$ in facility monitoring wells are reported in this area. Also, within this area are several small isolated areas in the vicinity of facility wells that exceed 100 $\mu\text{g/L}$. A smaller area of TCE contamination above 1,000 $\mu\text{g/L}$, less than 1/2-mile long and 1/4-mile wide, was observed slightly south of this area. PCE concentrations exceeding 100 $\mu\text{g/L}$ appear to be isolated in the vicinity of facility monitoring wells in this area.
- Beginning in the South Glendale OU, a southeasterly trending area of TCE contamination extends approximately 1-1/2 miles. TCE concentrations of 11,000 $\mu\text{g/L}$ in facility monitoring wells are reported in this area; however, these data are now 3 to 4 years old. Smaller areas of TCE contamination above 100 $\mu\text{g/L}$ are also observed in this area. Similar areas exist for PCE contamination exceeding 100 $\mu\text{g/L}$.
- Two areas in the vicinity of LADWP's Pollock production wells and the Taylor Yard south of the Pollock OU indicated TCE and PCE in excess of the MCLs. One area in the vicinity of LADWP's Pollock well is approximately 1/2 mile long and 3/4 mile wide. The second area, located in the Taylor Yard, contains small isolated areas with PCE concentrations as high as 1,600 $\mu\text{g/L}$ and TCE as high as 260 $\mu\text{g/L}$ from the latest data available.

Additional details of the shallow interval TCE and PCE concentration contour maps are located in Appendixes G and H, respectively. These appendixes present each concentration contour map with well locations, shown with a grid network imposed over the area within the 2- $\mu\text{g/L}$ L contour line. Each grid square is presented as a separate plate showing greater detail of the larger TCE and PCE concentration contour maps.

In the central portion of the Verdugo NPL site, recent production well data and RI monitoring well data indicate elongated areas in the vicinity of one production well exceeding the MCL for PCE. Data from all other wells have detectable concentrations of PCE below the MCL. TCE is reported below the MCL in one well in this area.

The nitrate concentration contour map of the upper interval shows nitrate exceeding the MCL of 45 mg/L based on available nitrate data (as NO_3). Somewhat similar to previous maps, there is a large elongated area, which covers most of the North Hollywood area and extends through the Crystal Springs North OU. In the North Hollywood area are several apparently isolated areas also exceeding the MCL. A separate, elongated area exceeding the MCL begins in the South Glendale OU and extends southward to the Pollock OU. An elongated area of nitrate contamination in excess of the MCL covers a large portion of the Verdugo area and extends southward.

3.3.4 Lower Interval

As discussed above, the concentrations of TCE and PCE appear to attenuate with depth (Figures 3-9 and 3-10). However, data for TCE and PCE from the lower interval are more limited. The area in the lower interval exceeding the 5- $\mu\text{g/L}$ concentration contour for both TCE and PCE generally underlies the area of contamination in the upper interval; however, it is less widespread than the contaminated area in the upper interval. A concentration contour for the 2- $\mu\text{g/L}$ laboratory detection limit is also shown for the lower interval.

The area of TCE concentration exceeding the 5- $\mu\text{g/L}$ concentration contour in the lower interval extends from south of the Burbank Airport to the southeast, with the highest concentrations located in an approximately 1-1/2-mile by 1/2-mile area located in the central portion of the North Hollywood OU and in an approximately 1-1/2-mile by 3/4-mile area located in the eastern portion of the North Glendale OU. Two smaller areas of TCE in the lower interval are located in the northern and central areas of the Pollock OU. The 2- $\mu\text{g/L}$ concentration contour conforms to the shape of the 5- $\mu\text{g/L}$ contour, encompassing the area to the north of Burbank Airport.

An area beginning at the Burbank Airport and extending southeasterly into the North Glendale OU is contained within the 5- $\mu\text{g/L}$ concentration contour for PCE in the lower interval. The apparent highest concentrations extend south-southeast of the Burbank Airport. An additional area exceeding the MCL for PCE in the lower interval is located between the Glendale South OU and the Pollock OU. The area within the 2- $\mu\text{g/L}$ concentration contour extends from north of the Burbank Airport and includes most of the North Hollywood and Glendale OUs.

Nitrate contamination in the lower interval is less extensive than observed in the upper interval (Figure 3-11). Several small isolated areas exceeding the MCL are located in the North Hollywood OU.